MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016 SESSION

TRQ3211/TIS3151 – SOFTWARE RELIABILITY & QUALITY ASSURANCE

(All sections / Groups)

2 March 2016
2:30 p.m. – 4:30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 5 pages with 6 Questions only.
2. Attempt all **SIX** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the Answer Booklet provided.

Question 1

a. It is said that explicit requirements of a software deal mainly with functionalities while implicit requirements focus on the quality aspect of the software. Provide ONE explicit requirement and ONE implicit requirement of an online banking system. [2 Marks]

b. Identify the relevant McCall's quality factor for each of the case described below (justify your answers):

(i) A departmental store has 2 bids for its tender to develop a Web application. Bid A requires three communication lines to set up the entire development and deployment environment and Bid B requires two lines. Bid B is to be chosen. [2 Marks]

(ii) The e-learning system of a university allows students to access study materials and view announcements. Access is denied for students to make any changes to this information. However, the lecturers are allowed to add and change data. [2 Marks]

(iii) The lecturer support software to be used in universities should be suitable for lecturers of all subjects and all faculties and the administrative staff must be able to print reports according to the lecturers' needs. [2 Marks]

c. According to IEEE definition, software consists of FOUR components. What are these components? [2 Marks]

Continued ...

Question 2

a. A software engineer during the testing process did not document the errors detected and the solutions to fix the errors. Also the testing process was terminated according to his convenience which led to errors. What would be the consequence of this shortcoming in the testing process? [1 Mark]

b. Taking a process approach in software development has always been emphasized specially, by ISO 9001:2008 and CMMI (Capability Maturity Model Integration).

i) Explain what is a process? [1 Mark]
ii) Provide an example of a process related to software development and determine the inputs and outputs of this process. [3 Marks]
iii) How do you determine the effectiveness and efficiency of the process you selected in (ii) above? [3 Marks]

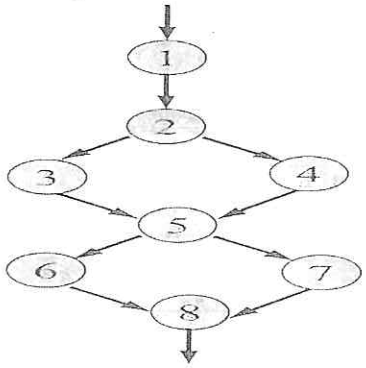
c. Most often, reliability of the software is improved when software faults are removed. However, study finds that removing 40% of software faults will not necessarily lead to a 40% reliability improvement. As a software quality assurance manager, you are required to come out with a strategy that is able to remove, say 20% of software faults and lead close to 20% of reliability improvement. [2 Marks]

Question 3

a. Describe the deliverables obtained from verification and validation (V&V) activities. [4 Marks]

Continued ...

b. Consider the diagram below which shows the path of a program where node 2 and node 5 are if-then-else conditions. Determine the path(s) that would cover full-path coverage for white-box testing. [2 Marks]



c. Differentiate between design review and peer review in terms of 'authority' and 'participants'. [4 Marks]

Question 4

a. Differentiate between internal attributes and external attributes in terms of how these attributes could be executed and measured. [4 Marks]

b. Under what condition(s) will independent verification and validation (IV&V) be conducted? [2 Marks]

c. Illustrate in a diagram, the activities of Plan, Do, Check, Act (PDCA) in Deming's wheel as emphasized in Total Quality Management (TQM) as well as in ISO 9001:2008 [4 Marks]

Continued ...

Question 5

a. One category of risk is the "risk of implementing new technology" while software is still under development. Suggest an appropriate way to mitigate this risk.

[3 Marks]

b. One way to ensure the quality of the software is to use reliable techniques when developing the software, for example, avoid using error prone constructs in programming. Identify THREE error prone constructs of C++ programming language and state the reason why these constructs have to be used in great care.

[4.5 Marks]

c. Consider the fragment of a C++ program below to answer the subsequent questions (i) and (ii).

```
1. void doagain()
2. {
3.     doagain();          //Function calls itself
4. }
5.
6. int main()
7. {
8.     doagain();          //Sets off the recursion
9. }
```

i) Will the above program continue forever? [1 Mark]

ii) Justify your answers in (i) above. [1.5 Marks]

Continued ...

Question 6

a. i) What is "information hiding" with respect to programming? [1 Mark]

ii) What possible benefits could be obtained when using "information hiding" technique in programming? [3 Marks]

b. Complete the C++ program below (Line 2 and Line 5) to demonstrate the implementation of "information hiding" technique in programming. [2 Marks]

```
1. class Circle {        // classname
2. //make data members accessible and available within this class only
3.         double radius;          // Data member (variable for radius)
4.         string color;           //  Data member (variable for color)
5. // make member functions accessible and available to all in the system
6.         double getRadius();     // Member function to get radius
7.         double getArea();       // Member function to obtain area
8.             }
```

c. i) What is safety-critical software? [1 Mark]

ii) Provide an example of safety-critical software. [1 Mark]

iii) Explain why a reliable system may not necessarily be safe to use? [2Marks]

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